CRA Reports (continued)

"Choice of Discount Rates for Utility Planning: A Critique of Conventional Betas as Risk Indicators for Electric Utilities." Published by the Electric Power Research Institute. February 1984.

"Choice of Discount Rates in Utility Planning: An Attempt to Estimate a Multi-Factor Model of the Cost of Equity Capital." December 1983.

"Southern California Edison Company Study of Conservation Potential and Goals." December 1983.

"Economic Costing Principles for Telecommunications." September 1983.

"Analysis of Risky Investments for Utilities." Published by the Electric Power Research Institute. September 1983.

"A Conceptual Model of Discount Rates for Utility Planning." July 1982.

"The Electric Utility Industry's Financial Condition: An Update." Published by the Electric Power Research Institute. June 1982.

"Choice of Discount Rates in Utility Planning: Principles and Pitfalls." Published by the Electric Power Research Institute. June 1982.

"Analysis of the Federal Residential Energy Tax Credits." April 1982.

"Methods Used to Estimate the Cost of Equity Capital in Public Utility Rate Cases: A Guide to Theory and Practice." March 1982.

"An Analysis of the Interaction of the Coal and Transportation Industries in 1990." September 1981.

"An Analysis of the Residential Energy Conservation Tax Credits: Concepts and Numerical Estimates." June 1981.

"Methodology for Measuring Consumer Impacts of Automobile Fuel Economy Regulations." Interim Report. November 1978.

APPENDIX B

EMPIRICAL PROCEDURES

APPENDIX B
EMPIRICAL PROCEDURES

This Appendix contains a description of the inputs and empirical procedures used in this report to make recommendations to the Commission on the rate of return on assets for the average company in the cable service industry. Cost of equity estimates calculated from our procedures are also presented.

Our analysis of the required rate of return on assets consisted of six major steps:

1. Selection of sample companies to represent the cable service industry and the regulated telephone industry.
2. Collection of data.
3. Estimation of constant-growth and variable-growth Discounted Cash Flow (DCF) models for the dividend paying companies in the S&P 400.
4. Calculation of relative risk for our sample of cable service companies and the regulated telephone industry.[1]
5. Estimation of two risk-positioning models, the Capital Asset Pricing Model (CAPM) and an empirical version of the CAPM, the ECAPM, for the full sample of companies in the S&P 400 for which data were available, the sample of cable service companies and the sample of telecommunication companies.
6. Adjustments to risk positioning and DCF cost of equity estimates for leverage.

The selection of sample companies is discussed in the report. This Appendix discusses the remaining points and is organized as follows. Section I contains a description of the data and data sources. Section II describes the methodology for the estimation of the constant-growth and variable-growth DCF models. Section III describes the methodology for the relative risk

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[1] S&P 400 equity betas were obtained directly from Compustat and follow an equivalent estimation procedure to that described here.

calculation. Section IV discusses the methodology for the risk positioning models. Section V discusses the methods to adjust the cost of equity estimates for leverage. Tables referenced in the sections are attached at the back of this appendix.

I. DATA SOURCES

Financial data for the companies in the S&P 400 were obtained from Compustat.[2] Data on debt, working capital, capital leases, preferred stock, common shares outstanding, book value of equity, bond ratings and dividends were obtained for December 1989 through December 1993. 1994 betas for the S&P 400 were also obtained from Compustat. Missing data were filled in where possible with data available from Value Line.

Cable service company data on debt, preferred stock, common shares outstanding, book value of equity and net worth were obtained from annual reports. Cable service revenue as a percentage of revenues was obtained from the most recent annual reports. However, when this information was not available in the annual report, it was obtained by calling the company directly. Dividend histories for each cable service company from 1988 to the present were obtained from Compuserve.

Telephone company data on debt, preferred stock, common shares outstanding, book value of equity and net worth were obtained from annual reports.

Company bond ratings for the cable company and telecommunication company samples were obtained from *Standard and Poor's Bond Guide*. For all companies, bond yields were also obtained from *Standard and Poor's Bond Guide* for December of 1989-1993 and April 1994.

Monthly and weekly stock price data, adjusted for dividends and stock splits, and returns for the S&P 500 were obtained from Compuserve. Unadjusted stock prices for the last five days

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[2] There were 378 companies in the S&P 400 Industrials as of May 9, 1994. Four companies in the S&P 400 were eliminated from our sample because financial data were not available for them on Compustat. Additional companies were also eliminated from the S&P 400 sample because I/B/E/S earnings growth forecasts were not available. We were left with a sample of 358 companies.

of each year were also obtained from Compuserve for the calculation of the market value of equity. Unadjusted stock prices for the last five days of April 1994 were also obtained from Compuserve for use in the DCF models.

The monthly time series of 30-day Treasury bills was obtained from Ibbotson Associates through December 1993. Monthly Treasury bill data for January 1993 through April 1994 were obtained from the Federal Reserve. The weekly time series of 90-day Treasury yields was obtained from Compuserve for January 1993 through the end of April 1994.

Growth rate estimates for the companies in the S&P 400 were taken from the April 1994 Institutional Brokers Estimate System (I/B/E/S) monthly *Earnings Estimate Report*. The I/B/E/S mean five-year annual earnings growth rate was employed directly in several models. The I/B/E/S earnings forecasts also allowed us to calculate annual growth rates for the remainder of fiscal year 1994, fiscal year 1995 and for fiscal years 1996 through 1998. That is, the I/B/E/S growth rate for year one, for year two and for years one through five inclusive, imply an average growth rate for years three through five.

II. DISCOUNTED CASH FLOW MODELS

DCF cost of equity estimates were obtained for the dividend paying companies in the S&P 400. Of the 358 companies in the sample, 309 companies pay dividends. Dividends, growth rates and price data are described above. Dividends are the last reported quarterly dividend and prices are estimated as the average closing price for the last five trading days in April 1994. The estimates are as of April 1994 and are estimated assuming a pattern of quarterly dividend payments.

Constant-Growth DCF Model

For the 309 dividend paying companies in the S&P 400 we estimated the constant-growth DCF model using the I/B/E/S five-year annual earnings forecasted growth rate for the

estimate of the growth rate, g_{DIV}. This is referred to as the CG-IBES model. The DCF cost of equity estimates were obtained using a quarterly version of the following formula.

$$r = \frac{DIV_1}{P} + g_{DIV} \quad ,$$

where r is the cost of equity; DIV_1 is the next expected dividend and P is the market price of the stock.

Variable-Growth DCF Model

The variable-growth DCF models make use of the year-by-year growth rate information available from I/B/E/S. The variable-growth model is premised on the same present value relationship as the constant-growth model. It assumes that the market price of a stock equals the present value of forecasted dividends per share. This present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{DIV_1}{(1 + r)} + \frac{DIV_2}{(1 + r)^2} + \ldots + \frac{DIV_T + P_{TERM}}{(1 + r)^T} \quad ,$$

where DIV_t is the dividend expected at the end of period t; T is the last period for which dividends are explicitly forecasted, and P_{TERM} is the expected stock price at which the stock is assumed to be sold. P and r are defined above. The cost of equity can be calculated given the current stock prices, forecasts for dividends, and P_{TERM}.

The variable-growth model assumes that the second-quarter 1994 dividend is the first dividend to be received. Since our price data coincides closely with the end of the first quarter, the second quarter dividend is the next expected dividend to be paid. The third-

quarter dividend is equal to the second-quarter dividend increased by one quarter's growth at the growth rate in earnings forecasted by I/B/E/S for fiscal year 1993 to 1994. For 1995, the dividends increase by the growth rate in earnings forecasted by I/B/E/S for fiscal year 1994 to 1995. Dividends for the years 1996 through 1998 increase at the implied quarter nine to 20 earnings growth rate.

The terminal price, P_{TERM}, is estimated as

$$P_{TERM} = \frac{DIV_{T+1}}{(r - g_{TERM})} \quad ,$$

where DIV_{T+1} is the last period dividend increased at the terminal growth rate and g_{TERM} is the expected long-term growth rate.

We considered two long-term growth rates:

VG-IBES Model: I/B/E/S mean five-year earnings growth rate forecast

VG-Q920 Model: Derived I/B/E/S quarter nine to 20 earnings growth rate

The constant-growth and variable-growth DCF estimates for the dividend paying companies in the S&P 400 are presented in Table B-1. For ease of reference, the corresponding all-equity estimates follow in Table B-2.

III. RELATIVE RISK CALCULATIONS

Company Stock Returns

The monthly return on a stock, r_E, is based on the change in share price over the month, plus any dividends paid during the month.[3]

$$r_{E\,t} = [P_t + DIV_t - P_{t-1}] / P_{t-1}$$

where P_t stock price at the end of month t, and DIV_t is the dividend, if any, paid during month t.

Equity Betas

Five-year equity betas were calculated for the sample of cable service companies for December of each year from 1987 to 1993 and for April 1994. Five-year equity betas for the sample of telecommunication companies were estimated only for April 1994.

The return on one-month U.S. Treasury bills is subtracted from the company returns before computing betas. To compute a five-year beta for, say, December 1990, returns for the 60 months preceding and including December 1990 (minus the Treasury bill returns) are regressed on the S&P 500 returns (minus the Treasury bill returns). Beta is the slope coefficient in the following regression:

$$\tilde{r}_E - r_f = \alpha + \beta_E (\tilde{r}_m - r_f) + \tilde{e}$$

[3] Weekly returns are calculated in a similar fashion using weekly prices.

where $\tilde{r}_E$ is the actual company stock return, α is a constant, r_f is the risk-free (one-month Treasury bill) rate, β_E (equity beta) measures risk, $\tilde{r}_m$ is the return of the Standard & Poor's Index (S&P 500), and $\tilde{e}$ is a residual.[4]

For the sample of cable service companies, we also estimate 52-week and 24-month betas for December 1993 and April 1994. The estimation procedure for these betas follows that described for the five-year equity betas. However, for the 24-month betas, only 24 months of data are used in the regressions. Similarly for the 52-week betas, weekly data are employed and 52 weeks of data through the end of the month are used in the regressions.[5]

Thin Trading Adjusted Betas

The procedures followed to adjust for thin trading bias are documented in Dimson (1979).[6] Thin trading adjusted betas were estimated for December 1993 and April 1994. To compute a five-year thin trading adjusted beta for, say, April 1994, monthly stock returns for the 59 months[7] preceding and including April 1994 are regressed on the market return, r_M, the market return lagged one period, r_{M-1}, and the lead market return, r_{M+1}. Three betas are obtained from the slope coefficients in the following regression:

$$\tilde{r}_E = \alpha + \beta_{-1} \times \tilde{r}_{m-1} + \beta_1 \times \tilde{r}_m + \beta_{+1} \times \tilde{r}_{m+1} + \tilde{e} \quad ,$$

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[4] For the years 1987 through 1993, the equity betas are estimated for the 60 months preceding and including December of the year. For 1994, the equity betas are estimated for the 60 months preceding and including April.

[5] Ninety-day Treasury yields were used in the 52-week beta calculations because a weekly time series on one-month Treasuries was not available. We tested to see if this affected the estimated beta, and it did not.

[6] Dimson, E. "Risk Measurement When Shares are Subject to Infrequent Trading", *Journal of Financial Economics*. Volume 7, (1979), pages 197-226.

[7] 59 months of returns were employed in the regressions because one monthly return is lost in the lag calculations of the market.

where $\tilde{r}_E$, α, and $\tilde{e}$ are defined above. The adjusted thin trading beta, β_{adj} is calculated as the sum of the estimated betas in the equation above.

$$\beta_{adj} = \beta_{-1} + \beta_1 + \beta_{+1} .$$

IV. Risk Positioning Models

We present the results of two risk positioning analyses, the CAPM and the ECAPM. Both involve two basic steps to provide the benchmarks that locate the capital market risk-return line: first, determine the market risk premium investors currently expect; and second, derive the forecast of short-term interest rates. The third step, and the one that varies between the two methods, is to combine these data with measures of the relative risk of the sample companies to estimate the cost of equity.

The Market Risk Premium

The "market risk premium" in the CAPM and in other models of the cost of capital is the excess of the expected rate of return on an average-risk portfolio over the short-term risk-free interest rate. There is considerable evidence to suggest that 8.5 percent is a good estimate of the market risk premium.

The best evidence on the premium that investors require to bear risk today is the average premium in the rates of return they have actually earned over long periods. This is because stock returns are extremely volatile. One implication is that scholarly attempts to use historical data to identify changes in the market risk premium have generally not succeeded. There is some weak evidence that the market risk premium is higher than average when the stock market is more volatile than average, but the evidence is also consistent with the view that the market risk premium never changes at all. Moreover, there is no reliable way to quantify just how much the market risk premium might differ from the average value at any given time. As a result, the long-run realized risk premium is the best estimate of the risk premium investors expect today.

Evidence on the realized risk premia are found in the Ibbotson Associates data. From 1926 to 1993, Ibbotson Associates data show that the average premium of stocks over Treasury bills is 8.6 percent. Now that we have over 40 years of post-war data, it is also useful to check that period. The risk premium for 1947-1993 is 8.4 percent. (We exclude 1946 because its economic statistics are heavily influenced by the War years; *e.g.*, the end of price controls yielded an inflation rate of 18 percent. It is not really a "post-War" year, from an economic viewpoint.) These averages often change slightly when another year of data is added to the Ibbotson series, but they have been close to 8.5 percent for some time now.

Additionally, a recent study provides new evidence on this topic, evidence based on the DCF approach applied to the market as a whole. Specifically, Professors Robert S. Harris and Felicia C. Marston have recently studied the market risk premium over the period 1982 to 1991.[8] They find that the average expected risk premium of stocks over government *bond* yields was 6.47 percent. The average maturity premium of government bond yields over one-month Treasury *bills* over 1982-1991 was 1.73 percent. The sum of these, 8.20 percent, can be compared to the 8.5 percent risk premium of stocks over bills that we use. However, it is a downward-biased estimate of the true risk premium of stocks over bills, for two reasons.

First, Professors Harris and Marston cannot apply their approach to stocks that pay no dividends, but no-dividend stocks tend to be riskier than average. Therefore, their sample omits a class of companies that would tend to pull their average risk premium up. Second, the stock price of companies that have valuable growth options will be higher than the DCF model assumes, so the DCF costs of capital derived from such stock prices will underestimate the stocks' true costs of capital. The market as a whole will include a good many such companies.

These two factors imply that the Harris-Marston paper supports our conclusion that 8.5 percent is a reasonable estimate for today's market risk premium.

Based on the above discussion, we conclude that stocks of average risk today command a premium of about 8.5 percent over the risk-free rate.

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[8] ("Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts," *Financial Management* (Summer 1992): 63-70).

Interest Rate Forecast

We require an interest rate forecast that corresponds to the market risk premium over short-term Treasury bills. We rely on the market's implicit forecast of future short-term rates. Table B-3 contains the yields for Treasuries of various maturities as of April 1994 collected from the Wall Street Journal. Intermediate- and long-term interest rates contain a risk premium, sometimes called a "maturity premium", over short-term rates. The maturity premium represents compensation for the additional risk associated with the tying up of a lender's money for a longer period. We subtract the maturity premium from the market forecasts to get the embedded short-term interest rate of the market. The maturity premium is based on historic data published annually by Ibbotson Associates.

The implied average short-term rates shown in Table B-3 are increasing. The market clearly expects short-term interest rates to increase in coming years. Our use of a 5.0% risk-free rate is consistent with a review by the Commission after two to three years. This appears to be a reasonable assumption given the stability of the telecommunications rate of return. A longer period between updates would imply that a higher risk-free rate should be used.

Risk Positioning Models

The market risk premium, interest rate forecast and beta estimates combine directly as described in the body of the report to yield the CAPM cost of equity. Specifically the following formula is employed.

$$r_{CAPM} = r_f + \beta \; x \; MRP \quad ,$$

where, r_{CAPM} is the CAPM cost of equity estimate, r_f is the risk free rate, MRP is the market risk premium and β is the measure of relative risk.

The ECAPM is a slightly flatter line than that given by the CAPM. Several studies have attempted to measure the revised equation.[9] Based on these findings we have estimated the ECAPM using the following equation:

$$r_{ECAPM} = (r_f + 2.0\%) + \beta x\ (MRP - 2.0\%) \quad ,$$

where r_{ECAPM} is the empirical CAPM cost of equity estimate and the other variables are defined above.

Risk positioning cost of equity estimates were estimated for the dividend and non-dividend paying companies in the S&P 400, the sample of cable companies and the sample of telecommunication companies. These risk positioning cost of equity estimates for the S&P 400 are reported in Tables B-4 through B-6. For the sample of cable companies the CAPM and ECAPM cost of equity estimates are reported in Tables B-7 and B-8, respectively. For the sample of telephone companies, the CAPM and ECAPM cost of equity estimates are reported in Tables B-9 and B-10, respectively.

V. LEVERAGE ADJUSTMENTS

Cost of equity estimates and equity betas reflect financial risk brought about by leverage. If the capital structure for a company changes, the cost of equity and the equity beta will also change. Cost of equity estimates for companies in the S&P 400, the sample of cable service companies and the sample of telecommunication companies are unlevered to eliminate any affect of debt. These cost of equity estimates are referred to as "all-equity" cost of capital estimates, and reflect only the business risk of the company.

All-equity cost of capital estimates for the sample of cable companies and the sample of telecommunication companies also are relevered to the hypothetical capital structure of 50

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[9] For a good example see Litzenberger, R., and K. Ramaswamy, "The Effect of Personal Taxes and Dividends and Capital Asset Prices: Theory and Empirical Evidence," *Journal of Financial Economics*, June 1979, pages 163-195.

percent debt and 50 percent equity. Equity betas for the cable company sample likewise were adjusted to reflect the hypothetical capital structure of 50 percent debt and 50 percent equity.

Cost of Equity Leverage Adjustments

We started by assuming that the *overall* regulatory weighted-average cost of capital does not depend on capital structure.[10] Thus, these leverage adjustments are according to the "MM58" formula.[11]

$$\textit{Overall cost of capital} = r_D \frac{D}{V} + r \frac{E}{V} \quad .$$

The leverage adjustment required two steps. First, the cost of equity estimate r, the cost of debt r_D, and the actual market debt-to-value (D/V) and equity-to-value (E/V) ratios were used to calculate each company's overall cost of capital.[12] The overall cost of capital then is equivalent to the all-equity cost of capital or the business risk of the company. For the cable company sample and the telephone company sample, this overall cost of capital or all-equity cost of capital was "relevered" to obtain a cost of equity at the hypothetical debt ratio.

The cost of debt for each company was determined by its bond rating as reported in *Standard & Poor's Corporation Bond Guide* for April 1994. Corporate bond yields are averages for the month of April 1994, also from *Standard and Poor's Bond Guide*. The cost of debt

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[10] This implies that the after-tax weighted average cost of capital declines as D/V increases, but that the risk of the present value of interest tax-shields is the same as the asset and operating risk of the company. However, if interest tax shields are safe, debt-equivalent cash flows, then a tax adjustment enters the unlevering and relevering. *See* Taggart (1991) for a review of alternative treatments of taxes in cost of capital calculations.

[11] F. Modigliani and M.H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, Volume 48, June 1958, pages 261-297.

[12] DCF cost of equity estimates were unlevered using the latest available capital structure data. Risk positioning cost of equity estimates were unlevered using the average debt-to-equity ratios for the last five years, to correspond to the betas used.

corresponding to the hypothetical capital structure was assumed equal to 8.5%, the Commission's interim cost of debt from the Cost-of-Service Order.[13]

Equity Beta Leverage Adjustments

Relevered equity betas, β_E^L, are derived by first unlevering the equity beta estimated at the current capital structure, β_E, to get the asset beta, β_A; then relevering the asset beta at the hypothetical capital structure. Asset betas reflect the risk of assets and operations, exclusive of the financial risk brought about by leverage.[14]

The following formulas are used to unlever and relever the equity betas,

$$\beta_A = \beta_D \times \frac{D}{V} + \beta_E \times \frac{E}{V}$$

$$\beta_E^L = \beta_A \times (1 + \frac{\hat{D}}{E}) - \hat{\beta}_D \times \frac{\hat{D}}{E}$$

where $\frac{D}{V}$ and $\frac{E}{V}$ are the debt-to-value and equity-to-value ratios for the specific cable company, β_D is the debt beta for the cable company, $\hat{\beta}_D$ is the debt beta corresponding to the hypothetical capital structure and $\frac{\hat{D}}{E}$ is the hypothetical debt-to-equity ratio.

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[13] Cost-of-Service Order, ¶190.

[14] These formulas correspond to the standard regulatory calculation of the weighted average cost of capital, and also follow the "MM58" formula.

The debt beta for the S&P 400 is assumed to be equal to 0.25. The debt beta for the average cable company is assumed to be equal to 0.45.[15]

Capital Structure Estimation

Market Value of Common Equity

The market value of common equity is calculated by multiplying the price per share by the number of shares outstanding at the end of the calendar year. The average of the unadjusted prices for the last five trading days of the calendar year is used in the market value of equity calculations.

Market Value of Debt

The market value of debt, D, is computed assuming a ten-year average maturity for long-term debt. The principal is assumed to be repaid at maturity and an annuity formula is used for computing the present value of the interest payments. Therefore, the market value of debt is calculated as:

$$D = IP \times \frac{[1-(1+r_D)^{-10}]}{r_D} + \frac{LTD}{(1+r_D)^{10}} + STD + CL + PE$$

[15] The basis for these calculations is as follows. We calculated the implied beta based on yields from the *S&P Bond Guide*, current estimates of the future short-term Treasury yield (estimated as the yield on long-term Treasury bonds less the 1.5 percentage point maturity premium above U.S. Treasury bills) and the market risk premium of 8.5 percent. The implied beta is equal to the difference between actual corporate bond yields and the future short-term Treasury yield divided by the market risk premium. The S&P bond rating for most of the cable companies in our sample is a "B" rating. These are highly risky bonds. The results from our analysis suggest that the implied beta for bonds with this rating are 0.65. However, some of this is a default premium. Therefore, 0.45 is a reasonable estimate of the debt beta for these cable companies. Similar considerations suggest a beta of 0.25 for the hypothetical capital structure.

where r_D is the yield on the corporate debt, IP is the interest payment, LTD is the book value of long-term debt, STD is short-term debt (included only if working capital is negative), CL is the value of capitalized lease commitments, and PE is the market value of preferred equity (estimated at book value).

In cases where sufficient data were not readily available, the market value of debt is assumed to equal the book value of debt. The finance theories employed here are developed under assumptions of market values. However, the book values of debt and preferred stock are less likely to be widely different from their market values than are common stock book values.

Value of the Firm

The market value of the firm is equal to the total market value of debt plus the market value of equity.

Table B–1

DCF COST OF EQUITY ESTIMATE SUMMARY SHEET
STANDARD & POORS 400 INDUSTRIALS
APRIL 1994

Constant Growth DCF Model

Cost of Equity	Fourth Quartile	Third Quartile	Second Quartile	First Quartile	Total
Number of Observations	78	77	77	77	309
Average per Quartile	19.32%	15.59%	13.96%	11.39%	15.08%
Median per Quartile	17.85%	15.55%	13.97%	11.97%	14.75%
Maximum per Quartile	81.39%	16.60%	14.69%	13.12%	81.39%
Minimum per Quartile	16.61%	14.75%	13.13%	6.21%	6.21%

Variable Growth – Terminal Growth Rate = I/B/E/S 5–Year Annual Growth Rate

Cost of Equity	Fourth Quartile	Third Quartile	Second Quartile	First Quartile	Total
Number of Observations	78	77	77	77	309
Average per Quartile	18.68%	15.55%	13.94%	8.43%	14.17%
Median per Quartile	17.79%	15.51%	13.94%	11.72%	14.63%
Maximum per Quartile	36.64%	16.50%	14.63%	13.06%	36.64%
Minimum per Quartile	16.51%	14.63%	13.09%	–100.00%	–100.00%

Variable Growth – Terminal Growth Rate = I/B/E/S 3–5 Fiscal Year Growth Rate

Cost of Equity	Fourth Quartile	Third Quartile	Second Quartile	First Quartile	Total
Number of Observations	78	77	77	77	309
Average per Quartile	21.33%	15.22%	10.81%	–7.48%	10.01%
Median per Quartile	18.72%	15.29%	10.88%	–4.52%	13.71%
Maximum per Quartile	44.88%	16.91%	13.67%	6.69%	44.88%
Minimum per Quartile	17.00%	13.71%	6.84%	–99.82%	–99.82%

Table B–2

ALL–EQUITY COST OF CAPITAL ESTIMATE SUMMARY SHEET
STANDARD & POORS 400 INDUSTRIALS
APRIL 1994

Constant Growth DCF Model

Cost of Equity	Fourth Quartile	Third Quartile	Second Quartile	First Quartile	Total
Number of Observations	78	77	77	77	309
Average per Quartile	17.86%	14.36%	12.80%	10.57%	13.91%
Median per Quartile	16.68%	14.37%	12.81%	10.84%	13.60%
Maximum per Quartile	56.82%	15.23%	13.60%	11.99%	56.82%
Minimum per Quartile	15.26%	13.60%	12.01%	6.95%	6.95%
Average 1993 Market D/V Ratio	9.34%	13.56%	21.86%	32.29%	19.23%

Variable Growth – Terminal Growth Rate = I/B/E/S 5–Year Annual Growth Rate

Cost of Equity	Fourth Quartile	Third Quartile	Second Quartile	First Quartile	Total
Number of Observations	78	77	77	77	309
Average per Quartile	17.56%	14.34%	12.75%	8.94%	13.41%
Median per Quartile	16.67%	14.36%	12.80%	10.74%	13.54%
Maximum per Quartile	33.97%	15.21%	13.49%	11.95%	33.97%
Minimum per Quartile	15.25%	13.54%	11.97%	–63.39%	–63.39%
Average 1993 Market D/V Ratio	9.11%	13.08%	22.18%	32.68%	19.23%

Variable Growth – Terminal Growth Rate = I/B/E/S 3–5 Fiscal Year Growth Rate

Cost of Equity	Fourth Quartile	Third Quartile	Second Quartile	First Quartile	Total
Number of Observations	78	77	77	77	309
Average per Quartile	19.58%	14.16%	10.33%	–1.73%	10.61%
Median per Quartile	17.39%	14.27%	10.56%	0.37%	12.63%
Maximum per Quartile	42.81%	15.69%	12.62%	7.08%	42.81%
Minimum per Quartile	15.69%	12.63%	7.13%	–37.43%	–37.43%
Average 1993 Market D/V Ratio	11.07%	15.10%	21.63%	29.22%	19.23%

Table B – 3

April 1994 Treasury Note Yields
(Percent)

Trade Date	1–Year	2–Year	3–Year	4–Year	5–Year
4/04/94	4.86%	5.61%	6.10%	6.44%	6.67%
4/05/94	4.82%	5.49%	5.96%	6.26%	6.50%
4/06/94	4.79%	5.44%	5.91%	6.23%	6.45%
4/07/94	4.75%	5.40%	5.88%	6.19%	6.40%
4/08/94	4.81%	5.46%	5.95%	6.28%	6.49%
4/11/94	4.80%	5.45%	5.93%	6.28%	6.47%
4/12/94	4.74%	5.39%	5.88%	6.21%	6.41%
4/13/94	4.80%	5.44%	5.93%	6.27%	6.48%
4/14/94	4.82%	5.49%	5.97%	6.31%	6.51%
4/15/94	4.83%	5.52%	5.98%	6.30%	6.50%
4/18/94	4.97%	5.71%	6.18%	6.50%	6.71%
4/19/94	5.01%	5.73%	6.15%	6.47%	6.68%
4/20/94	4.98%	5.68%	6.12%	6.41%	6.63%
4/21/94	4.92%	5.58%	6.01%	6.29%	6.49%
4/22/94	4.95%	5.62%	6.04%	6.32%	6.52%
4/25/94	4.96%	5.61%	6.03%	6.30%	6.46%
4/26/94	4.97%	5.59%	5.99%	6.28%	6.46%
4/28/94	5.03%	5.73%	6.14%	6.47%	6.62%
4/29/94	5.08%	5.72%	6.15%	6.47%	6.63%
Average:	4.89%	5.56%	6.01%	6.33%	6.53%
Maturity Premium:	0.40%	0.65%	0.80%	0.90%	0.95%
Forecast:	4.49%	4.91%	5.21%	5.43%	5.58%
Risk free rate used:		5.00%			

Notes: Yield data taken from The Wall Street Journal, April 1994.
Maturity primia based on historical data from Ibbotson Associates.

Table B-4

CAPM COST OF EQUITY ESTIMATES
STANDARD & POORS 400 INDUSTRIALS – DIVIDEND PAYING COMPANIES
APRIL 1994

Results Sorted on Original Cost of Equity for Companies which Pay Dividends

	CAPM Cost of Equity				All-Equity Cost of Capital				Market Debt to Value				Number of Observations
	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	
Fourth Quartile	22.16%	16.10%	17.90%	17.56%	19.99%	11.78%	15.95%	NA	62.37%	0.00%	16.88%	NA	78
Third Quartile	16.08%	14.27%	15.19%	15.13%	15.71%	10.01%	13.67%	NA	67.66%	0.00%	20.91%	NA	77
Second Quartile	14.27%	12.45%	13.42%	13.40%	13.72%	9.84%	12.29%	NA	73.73%	0.52%	20.66%	NA	77
First Quartile	12.43%	2.28%	10.35%	10.98%	12.25%	3.82%	9.97%	NA	60.98%	0.00%	18.49%	NA	77
Total	22.16%	2.28%	14.23%	14.27%	19.99%	3.82%	12.98%	NA	73.73%	0.00%	19.23%	NA	309

Results Sorted on All-Equity Cost of Capital for Companies which Pay Dividends

	CAPM Cost of Equity				All-Equity Cost of Capital				Market Debt to Value				Number of Observations
	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	
Fourth Quartile	22.16%	14.80%	17.43%	NA	19.99%	14.62%	16.36%	16.07%	36.66%	0.00%	9.21%	NA	78
Third Quartile	19.03%	12.96%	15.00%	NA	14.58%	12.76%	13.63%	13.56%	39.10%	0.52%	18.19%	NA	77
Second Quartile	20.20%	11.38%	13.73%	NA	12.75%	11.38%	12.08%	12.13%	63.51%	0.00%	22.63%	NA	77
First Quartile	15.99%	2.28%	10.70%	NA	11.35%	3.82%	9.80%	10.25%	73.73%	0.00%	27.02%	NA	77
Total	22.16%	2.28%	14.23%	NA	19.99%	3.82%	12.98%	12.76%	73.73%	0.00%	19.23%	NA	309

Table B-5

ECAPM COST OF EQUITY ESTIMATES
STANDARD & POORS 400 INDUSTRIALS – DIVIDEND PAYING COMPANIES
APRIL 1994

Results Sorted on Original Cost of Equity for Companies which Pay Dividends

	ECAPM Cost of Equity				All-Equity Cost of Capital				Market Debt to Value				Number of Observations
	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	
Fourth Quartile	20.12%	15.49%	16.86%	16.60%	18.28%	11.34%	15.14%	NA	62.37%	0.00%	16.88%	NA	78
Third Quartile	15.48%	14.09%	14.79%	14.75%	15.15%	9.95%	13.36%	NA	67.66%	0.00%	20.91%	NA	77
Second Quartile	14.09%	12.69%	13.44%	13.42%	13.59%	9.89%	12.31%	NA	73.73%	0.52%	20.66%	NA	77
First Quartile	12.68%	4.92%	11.09%	11.57%	12.51%	5.81%	10.56%	NA	60.98%	0.00%	18.49%	NA	77
Total	20.12%	4.92%	14.06%	14.09%	18.28%	5.81%	12.85%	NA	73.73%	0.00%	19.23%	NA	309

Results Sorted on All-Equity Cost of Capital for Companies which Pay Dividends

	ECAPM Cost of Equity				All-Equity Cost of Capital				Market Debt to Value				Number of Observations
	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	Maximum	Minimum	Average	Median	
Fourth Quartile	20.10%	14.36%	16.41%	NA	18.28%	14.23%	15.56%	15.29%	31.23%	0.00%	8.57%	NA	78
Third Quartile	20.12%	12.94%	14.65%	NA	14.18%	12.70%	13.37%	13.32%	39.10%	0.52%	17.79%	NA	77
Second Quartile	18.44%	11.76%	13.56%	NA	12.68%	11.46%	12.11%	12.12%	62.37%	0.00%	21.40%	NA	77
First Quartile	18.62%	4.92%	11.57%	NA	11.45%	5.81%	10.31%	10.63%	73.73%	0.00%	29.30%	NA	77
Total	20.12%	4.92%	14.06%	NA	18.28%	5.81%	12.85%	12.70%	73.73%	0.00%	19.23%	NA	309

Table B-6

RISK POSITIONING COST OF EQUITY ESTIMATES
STANDARD & POORS 400 INDUSTRIALS — NON-DIVIDEND PAYING COMPANIES
APRIL 1994

Company Name	Beta	CAPM Cost of Equity	April 1994 Bond Yield	All-Equity CAPM Cost of Capital	ECAPM Cost of Equity	All-Equity ECAPM Cost of Capital	Debt to Value Market
ADVANCED MICRO DEVICES	1.502	17.77%	10.62%	16.79%	16.76%	15.93%	9.7%
AMGEN INC	1.212	15.30%	8.50%	15.12%	14.88%	14.71%	2.7%
AMDAHL CORP	1.234	15.49%	8.54%	14.55%	15.02%	14.15%	20.0%
ANDREW CORP	1.048	13.91%	8.54%	13.19%	13.81%	13.11%	7.2%
ARMCO INC	1.323	16.25%	10.62%	13.69%	15.60%	13.34%	47.4%
ALZA CORP	1.919	21.31%	8.54%	20.25%	19.47%	18.56%	9.9%
BEVERLY ENTERPRISES	1.283	15.91%	9.54%	12.29%	15.34%	12.05%	46.3%
BALLY MFG CORP	2.063	22.54%	9.54%	11.75%	20.41%	11.39%	79.0%
BIOMET INC	2.071	22.60%	8.54%	22.60%	20.46%	20.46%	0.0%
BETHLEHEM STEEL CORP	1.480	17.58%	10.62%	14.48%	16.62%	13.95%	33.7%
CROWN CORK & SEAL CO INC	0.630	10.36%	8.57%	10.01%	11.10%	10.61%	21.1%
CERIDIAN CORP	1.295	16.01%	9.54%	14.25%	15.42%	13.82%	2.6%
CLARK EQUIPMENT CO	1.023	13.70%	8.57%	12.26%	13.65%	12.22%	19.0%
COMMUNITY PSYCHIATRIC CNTRS	1.629	18.85%	8.54%	18.42%	17.59%	17.22%	6.5%
COMPAQ COMPUTER CORP	1.184	15.06%	8.57%	14.90%	14.70%	14.54%	0.0%
COMPUTER SCIENCES CORP	1.201	15.21%	8.54%	14.16%	14.81%	13.82%	13.4%
CISCO SYSTEMS INC	1.724	19.65%	8.54%	19.65%	18.21%	18.21%	0.0%
CRAY RESEARCH	0.983	13.36%	8.57%	12.68%	13.39%	12.71%	13.9%
DIGITAL EQUIPMENT	1.005	13.54%	8.50%	13.27%	13.53%	13.26%	18.5%
DATA GENERAL CORP	2.417	25.54%	10.62%	21.46%	22.71%	19.40%	32.7%
DSC COMMUNICATIONS CORP	0.927	12.88%	8.54%	11.77%	13.03%	11.88%	2.0%
FMC CORP	1.009	13.58%	8.57%	11.52%	13.56%	11.51%	31.0%
GENESCO INC	1.593	18.54%	9.54%	15.20%	17.35%	14.46%	51.4%
INLAND STEEL INDUSTRIES INC	1.407	16.96%	10.62%	13.67%	16.15%	13.27%	44.3%
INTERGRAPH CORP	1.506	17.80%	8.54%	17.53%	16.79%	16.55%	3.9%
KROGER CO	1.703	19.48%	9.54%	11.97%	18.07%	11.62%	66.9%
KING WORLD PRODUCTIONS INC	0.888	12.55%	8.54%	12.33%	12.77%	12.55%	0.0%
LOTUS DEVELOPMENT CORP	1.998	21.98%	8.54%	20.49%	19.99%	18.72%	3.1%
M/A-COM INC	1.695	19.41%	9.54%	15.83%	18.02%	14.94%	24.2%
MAXUS ENERGY CORP	0.532	9.52%	9.54%	9.53%	10.46%	9.94%	64.0%
NAVISTAR INTERNATIONL	1.076	14.15%	9.54%	11.37%	13.99%	11.31%	48.1%
NATIONAL EDUCATION CORP	2.438	25.72%	10.62%	20.55%	22.85%	18.66%	30.5%
NOVELL INC	1.799	20.29%	8.54%	20.15%	18.69%	18.57%	0.0%
NATIONAL SEMICONDUCTOR CORP	1.666	19.16%	9.54%	18.34%	17.83%	17.12%	15.8%
OWENS CORNING FIBRGLAS	2.465	25.95%	8.57%	17.24%	23.02%	15.78%	34.4%
ORACLE SYSTEMS CORP	1.756	19.93%	8.54%	19.53%	18.41%	18.07%	1.0%
PROMUS COS INC	2.337	24.86%	9.54%	18.26%	22.19%	16.74%	15.3%
ROWAN COS INC	0.992	13.43%	9.54%	12.42%	13.45%	12.44%	22.2%
ROLLINS ENVIRONMENTAL SVCS	1.354	16.51%	8.54%	16.41%	15.80%	15.71%	1.5%
RYAN'S FAMILY STK HOUSES INC	1.206	15.25%	8.54%	14.79%	14.84%	14.41%	10.8%
SANTA FE ENERGY RESOURCES	0.224	6.90%	9.54%	7.95%	8.46%	8.88%	38.9%
SHONEY'S INC	1.636	18.91%	9.54%	14.63%	17.63%	13.94%	35.4%
STONE CONTAINER CORP	2.145	23.23%	10.62%	13.26%	20.94%	12.78%	87.4%
SUN MICROSYSTEMS INC	1.320	16.22%	8.54%	15.42%	15.58%	14.84%	6.1%
TANDEM COMPUTERS INC	1.563	18.29%	8.54%	17.40%	17.16%	16.38%	11.2%
TOYS R US INC	1.163	14.89%	7.92%	14.59%	14.56%	14.28%	5.5%
UNISYS CORP	1.919	21.31%	9.54%	12.34%	19.47%	11.90%	62.7%
VARITY CORP	0.892	12.58%	8.57%	10.51%	12.80%	10.62%	9.1%
ZENITH ELECTRONICS CORP	1.310	16.14%	10.62%	13.79%	15.52%	13.43%	44.9%
Average:	1.444	17.27%	9.15%	14.99%	16.38%	14.38%	23.57%
Maximum Value:	2.465	25.95%	10.62%	22.60%	23.02%	20.46%	87.40%
Minimum Value:	0.224	6.90%	7.92%	7.95%	8.46%	8.88%	0.00%
Median:		16.51%		14.55%	15.80%	13.95%	

Table B–7

CAPM Cost of Equity for Cable Companies

Equity	Risk Free Rate [1]	Market Risk Premium [2]	Observed Beta [3]	CAPM Cost of Equity [4]	Debt / Value Ratio [5]	Cost of Debt [6]	All–Equity Cost of Capital [7]
Adelphia	5.0%	8.5%	2.37	25.2%	0.86	10.6%	12.7%
Cablevision	5.0%	8.5%	1.99	21.9%	0.73	10.6%	13.7%
Century	5.0%	8.5%	2.31	24.7%	0.59	9.5%	15.7%
Comcast A	5.0%	8.5%	1.64	18.9%	0.54	10.6%	14.4%
Comcast Special	5.0%	8.5%	1.55	18.2%	0.54	10.6%	14.1%
Jones Intercable	5.0%	8.5%	1.69	19.4%	0.66	10.6%	13.6%
Jones Intercable A	5.0%	8.5%	1.91	21.2%	0.66	10.6%	14.2%
Jones Spacelink	5.0%	8.5%	2.34	24.9%	0.81	10.0%	12.9%
TCA Cable	5.0%	8.5%	0.89	12.6%	0.29	10.0%	11.8%
Tele–Comm. A	5.0%	8.5%	1.79	20.2%	0.56	8.6%	13.7%
Tele–Comm. B	5.0%	8.5%	1.49	17.7%	0.56	8.6%	12.6%
Avg. Cable TV	5.0%	8.5%	1.82	20.4%	0.62	10.0%	13.6%

[8] Average All–Equity Cost of Capital	13.6%
[9] Hypothetical Debt to Value Ratio	0.50
[10] Relevered Average Cost of Equity	18.6%

Notes:
[1] From Table B–3.
[3] Sixty month equity beta to April, 1994.
[4] = [1] + ([2] x [3]).
[5] Average debt to value ratio for the years 1989–1993.
[6] Standard & Poors industrial bond yield for April 1994 corresponding to the company's debt rating. Companies not rated by S&P are assigned the average of the other companies' yields.
[7] = ([6] x [5]) + ([4] x (1–[5])).
[10] = ([8]–(8.5% x [9])) / (1–[9]).

Table B–8

ECAPM Cost of Equity for Cable Companies

Equity	Risk Free Rate [1]	Market Risk Premium [2]	Observed Beta [3]	CAPM Cost of Equity [4]	Debt / Value Ratio [5]	Cost of Debt [6]	All–Equity Cost of Capital [7]
Adelphia	5.0%	8.5%	2.37	22.4%	0.86	10.6%	12.3%
Cablevision	5.0%	8.5%	1.99	19.9%	0.73	10.6%	13.1%
Century	5.0%	8.5%	2.31	22.0%	0.59	9.5%	14.6%
Comcast A	5.0%	8.5%	1.64	17.6%	0.54	10.6%	13.8%
Comcast Special	5.0%	8.5%	1.55	17.1%	0.54	10.6%	13.6%
Jones Intercable	5.0%	8.5%	1.69	18.0%	0.66	10.6%	13.1%
Jones Intercable A	5.0%	8.5%	1.91	19.4%	0.66	10.6%	13.6%
Jones Spacelink	5.0%	8.5%	2.34	22.2%	0.81	10.0%	12.4%
TCA Cable	5.0%	8.5%	0.89	12.8%	0.29	10.0%	12.0%
Tele–Comm. A	5.0%	8.5%	1.79	18.6%	0.56	8.6%	13.0%
Tele–Comm. B	5.0%	8.5%	1.49	16.7%	0.56	8.6%	12.2%
Avg. Cable TV	5.0%	8.5%	1.82	18.8%	0.62	10.0%	13.1%

[8]	Average All–Equity Cost of Capital	13.1%
[9]	Hypothetical Debt to Value Ratio	0.50
[10]	Relevered Average Cost of Equity	17.6%

Notes:
[1] From Table B–3.
[3] Sixty month equity beta to April, 1994.
[4] = [1] + 2.0% + ([3] x ([2]–2.0%)).
[5] Average debt to value ratio for the years 1989–1993.
[6] Standard & Poors industrial bond yield for April 1994 corresponding to the company's debt rating. Companies not rated by S&P are assigned the average of the other companies' yields.
[7] = ([6] x [5]) + ([4] x (1–[5])).
[10] = ([8]–(8.5% x [9])) / (1–[9]).